

Physics for Radiology

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Faculty of Science

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Quiz 3: US

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Review of preview

Started on	Thursday, 19 September 2013, 11:24 AM
Completed on	Thursday, 19 September 2013, 11:24 AM
Time taken	30 secs
Marks	0/19
Grade	0 out of a maximum of 10 (0%)

1

The wavelength of a 1MHz sound beam is not:

Marks: 1

Choose one answer.

- ☐ a. Velocity divided by frequency ✗
- ☐ b. 1.5 mm in soft tissue ✗
- ☐ c. The same in all solid media ✓
- ☐ d. 0.3 mm in air ✗
- ☐ e. 4.1 mm in bone ✗

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Incorrect

Marks for this submission: 0/1.

2

The velocity of an ultrasound beam is always:

Marks: 1

Choose one answer.

- ☐ a. Equal to the velocity of the molecules of the medium ✗
- ☐ b. Proportional to frequency cubed ✗
- ☐ c. 3 00000 km/second ✗
- ☐ d. Equal to frequency times wavelength ✓
- ☐ e. Constant for all solids ✗

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Incorrect

Marks for this submission: 0/1.

3

In Colour Doppler imaging, turbulences are depicted by green patterns.

Marks: 1

Choose one answer.

- ☐ a. False ✗
- ☐ b. True ✓

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Incorrect

Marks for this submission: 0/1.

4



The Q factor of a transducer refers to:

Marks: 1

Choose one answer.

- ☐ a. Coupling efficiency ✗
- ☐ b. Transducer dead time ✗
- ☐ c. Maximum intensity ✗
- ☐ d. Minimum intensity ✗
- ☐ e. Purity of the frequency ✓

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Incorrect

Marks for this submission: 0/1.

5



Reflections occur from all of the following except:

Marks: 1

Choose one answer.

- ☐ a. Bladder wall ✗
- ☐ b. Bladder contents ✓
- ☐ c. Fat-kidney interfaces ✗
- ☐ d. Kidney interior ✗
- ☐ e. Smooth surfaces ✗

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Incorrect

Marks for this submission: 0/1.

6



Acoustic impedance (Z) is primarily dependent on tissue:

Marks: 1

Choose one answer.

- ☐ a. Density ✓
- ☐ b. Attenuation ✗
- ☐ c. Temperature ✗
- ☐ d. Atomic number ✗
- ☐ e. Oxygenation ✗

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Incorrect

Marks for this submission: 0/1.

7



Which of the following has the highest acoustic impedance?

Marks: 1

Choose one answer.

- ☐ a. Fat ✗
- ☐ b. Water ✗
- ☐ c. Bone ✓
- ☐ d. Eye lens ✗
- ☐ e. Air ✗

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Incorrect

Marks for this submission: 0/1.

8



Higher-frequency transducers have increased:

Marks: 1

Choose one answer.

- ☐ a. Velocity ✗
- ☐ b. Intensity ✗
- ☐ c. Wavelength ✗
- ☐ d. Attenuation ✓
- ☐ e. Thickness ✗

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Incorrect

Marks for this submission: 0/1.

9

What fraction of ultrasound is reflected from a liver ($Z = 1.55$) and soft tissue ($Z = 1.65$) interface?

Marks: 1

Choose one answer.

- ☐ a. $1/2$ ✗
- ☐ b. $1/10$ ✗
- ☐ c. $1/500$ ✗
- ☐ d. $1/100$ ✗
- ☐ e. $1/1000$ ✓

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Incorrect

Marks for this submission: 0/1.

10

Choice of frequency in ultrasound is most likely a trade off between patient penetration and:

Marks: 1

Choose one answer.

- ☐ a. Lateral resolution ✗
- ☐ b. PRF ✗
- ☐ c. Contrast ✗
- ☐ d. Noise ✗
- ☐ e. Axial resolution ✓

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Incorrect

Marks for this submission: 0/1.

11

The Doppler shift from a moving object depends on all of the following except:

Marks: 1

Choose one answer.

- ☐ a. Frequency ✗
- ☐ b. Speed of ultrasound beam ✗
- ☐ c. Object depth ✓
- ☐ d. Object speed ✗
- ☐ e. Angle between beam and object ✗

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Incorrect

Marks for this submission: 0/1.

12

An ultrasound beam traveling through tissue cannot be:

Marks: 1

Choose one answer.

- ☐ a. Amplified ✓
- ☐ b. Reflected ✗
- ☐ c. Refracted ✗
- ☐ d. Scattered ✗
- ☐ e. Absorbed ✗

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Incorrect

Marks for this submission: 0/1.

13

The key factor determining the fraction of ultrasound reflected at a large interface is the:

Marks: 1

Choose one answer.

- ☐ a. Differences in acoustic impedance ✓
- ☐ b. Transducer output intensity ✗
- ☐ c. Depth of the interface ✗
- ☐ d. Scan mode (A, B, or M) ✗
- ☐ e. Transducer diameter ✗

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Incorrect

Marks for this submission: 0/1.

14

Sound waves are:

Marks: 1

Choose one answer.

- ☐ a. Audible at 1 MHz ✗
- ☐ b. Low-frequency electromagnetic radiation ✗
- ☐ c. Ionizing radiation ✗
- ☐ d. Constant velocity ✗
- ☐ e. Longitudinal waves ✓

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Incorrect

Marks for this submission: 0/1.

15

In Colour Doppler imaging

Marks: 1

Choose one answer.

- ☐ a. Blue colour informs about moving away ✓
- ☐ b. Red colour informs about moving away ✗
- ☐ c. The colour part informs about reflectivity and structure of tissues. ✗
- ☐ d. The black-white part contains information about movements ✗

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Incorrect

Marks for this submission: 0/1.

16

The best axial resolution is obtained using:

Marks: 1

Choose one answer.

- ☐ a. 10 MHz sector scanner ✓
- ☐ b. 5.0 MHz phased array ✗
- ☐ c. 5.0 MHz linear array ✗
- ☐ d. 5.0 MHz continuous-wave Doppler ✗
- ☐ e. 10 MHz continuous-wave Doppler ✗

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Incorrect

Marks for this submission: 0/1.

17



The wavelength of a 3 MHz sound beam is shortest in:

Marks: 1

Choose one answer.

- ☐ a. Muscle ✗
- ☐ b. Castor oil ✗
- ☐ c. Fat ✗
- ☐ d. Air ✓
- ☐ e. Bone ✗

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Incorrect

Marks for this submission: 0/1.

18



In B-mode ultrasound, the PRF does not affect:

Marks: 1

Choose one answer.

- ☐ a. Frame rate ✗
- ☐ b. Number of lines per frame ✗
- ☐ c. Pulses per second ✗
- ☐ d. Maximum penetration depth ✗
- ☐ e. Ultrasound frequency ✓

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Incorrect

Marks for this submission: 0/1.

19



Clinical ultrasound beams normally have an intensity of:

Marks: 1

Choose one answer.

- ☐ a. 5 W/cm² ✗
- ☐ b. 0.5 W/cm² ✗
- ☐ c. 0.5 mW/cm² ✗
- ☐ d. 5 mW/cm² ✓
- ☐ e. 50 mW/cm² ✗

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Incorrect

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